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Case Study

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FULL ARCH REHABILITATION OF MAXILLA WITH 4 IMPLANTS AND IMMEDIATE OCCLUSAL LOADING (ALL-ON-4 CONCEPT): A CASE REPORT

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ABSTRACT

The 'All-on-4' treatment concept is based on the insertion of four implants in the anterior region of completely edentulous jaws to support an immediate implant-supported fixed prosthesis. Combination of tilted and straight implants for supporting fixed prostheses can be considered a significant treatment modality leading to a simpler procedure, with less morbidity, reduced financial costs and a more comfortable postsurgical period for the patients. The authors have presented a case report with multiple missing teeth in maxillary arch resulting in difficulty in chewing and poor esthetics.

KEYWORDS: Maxillary arch, dental implants, All-on-4, multiunit abutments.

INTRODUCTION

The 'All-on-4' treatment concept was developed to maximize the use of available remnant bone in atrophic jaws, allowing immediate function and avoiding regenerative procedures that increase the treatment costs and patient morbidity, as well as the complications inherent to these procedures.[1] The protocol uses four implants in the anterior part of complete edentulous jaws to support a provisional, fixed and immediately loaded prosthesis. The two most anterior implants are placed axially, whereas the two posterior implants are placed distallyand angled to minimize the cantilever length, and to allow the application of prostheses with up to 12 teeth, thereby enhancing masticatory efficiency.[2,3] Immediate loading procedures for edentulous jaws have become widely popular among clinicians as well as among patients.[4-6] High survival rates and a low incidence of complications demonstrate the predictability of implant treatment, regardless of the loading regimen involved. The challenge today is not to prove functionality but rather to develop simple and cost-effective protocols.[7,8]

The 'All-on-4' treatment concept is based on the insertion of four implants in the anterior region of completely edentulous jaws to support an immediate implant-supported fixed prosthesis. The two most anterior implants are placed axially, whereas the two posterior implants are placed with a distal tilting of up to 45^0, allowing the connection of prostheses with up to 12 teeth. The 'All-on-4' treatment concept was developed to maximize the use of the available residual bone in atrophic jaws, allowing immediate function and avoiding regenerative procedures (such as bone grafting) that increase treatment costs, patient morbidity, and complications inherent to these procedures. The concept benefits from the use of tilted implants that relate to several surgical and prosthetic advantages previously described: The possibility of placing longer implants with improvement of bone anchorage by engaging the apex of the implant with the cortical bone of the anterior wall of the sinus, the reduction of the need for bone grafting, the possibility of reaching a more posterior implant position and avoiding long cantilevers, and a good antero-posterior spread with the possibility of increasing the distance between anterior and posterior abutments, resulting in an improvement of the load distribution.[9-12]

CASE PRESENTATION

A 62 years old female patient reported to the Department of Prosthodontics and Crown & Bridge, New Horizon Dental College and Research Institute, Bilaspur, Chhattisgarh. She complained of multiple missing teeth leading to difficulty in chewing and poor esthetics. She did not have any significant medical history. The intraoral examination revealed that her 16, 17, 12 and 27

were lost due to severe periodontitis and root stumps of 23 and 24 were there which was caused by dental caries. There was a bridge over 13, 14 and 15 and all other remaining teeth had severe gingival recession resulting in the exposure of their roots (Fig. 1- 4).

Figure 1-4: Preoperative clinical views.

Figure 5: Preoperative OPG.

The patient was advised for CBCT, OPG and complete blood count. The OPG showed advanced alveolar bone resorption in posterior maxilla as well as mandible and maxillary sinus pnuematization. The remaining dentition was found to be periodontally compromised (Fig. 5).

The "All-on-4" treatment plan for this patient was chosen looking at the clinical and radiographical findings that a graft-less solution of restoring a resorbed maxilla without having to do a sinus lift as the patient wanted a fixed prosthesis with acceptable function an esthetics with preference to immediate prosthesis after surgery.

On the pre-surgical phase, bite registration, mounting of the casts, teeth arrangement and heat cure acrylic temporary prosthesis fabrication were done (Fig. 6-8). Prior to the surgery, the patient was kept on anxiolytics, antibiotics, antacids and analgesics. The sizes of the implants were 4.2 x 10 for 12, 4.2 x 10 for 21, 4.2 x 16 for 14 and 4.2 x 16 for 25.

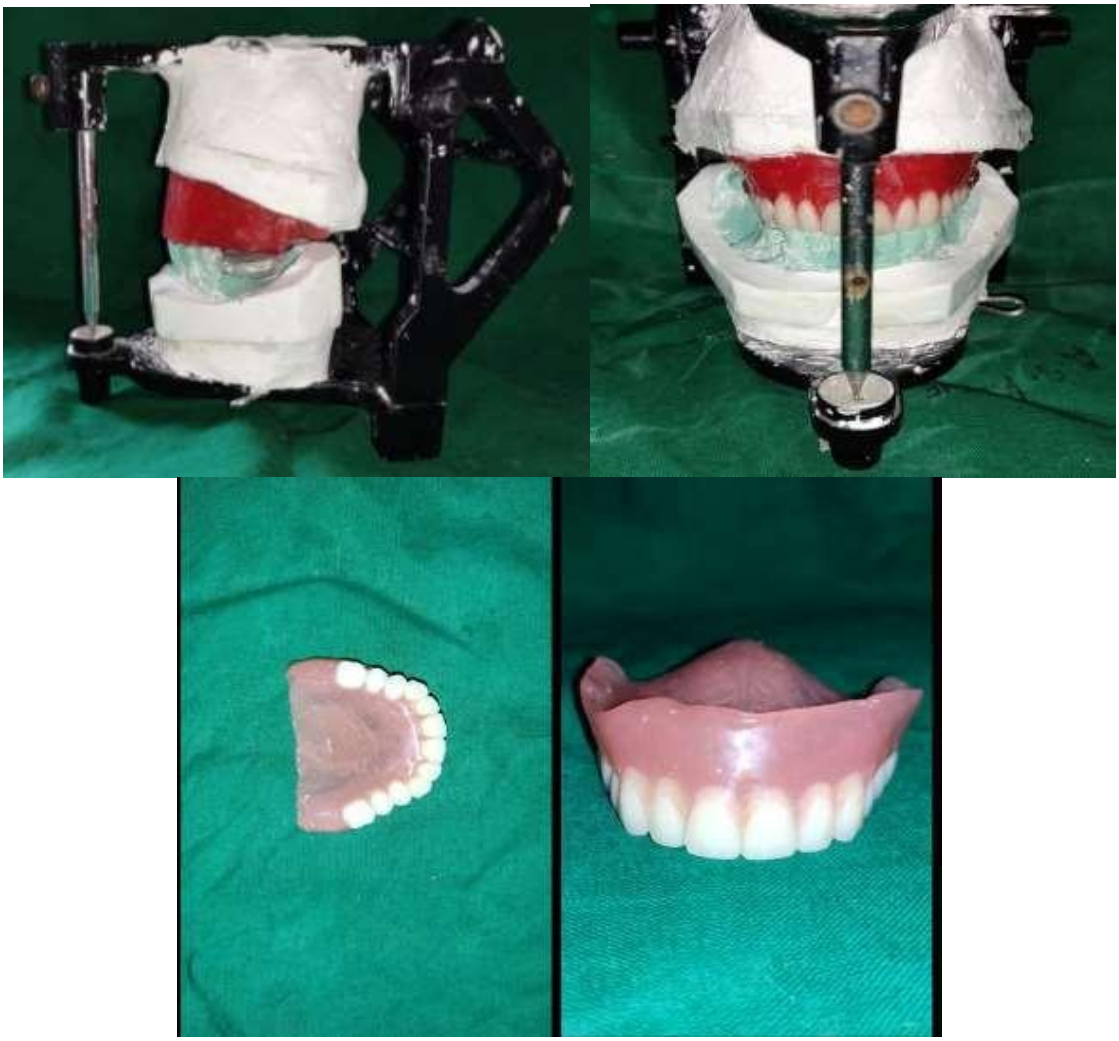

Figure 6-8: Bite registration, cast mounting, teeth arrangement and temporary prosthesisfabrication.

During the surgery under local anesthesia, a full thickness crestal incision was performed from the left first molar region to the right second premolar region. By atraumatic extraction, all the teeth and root stumps from the maxillary arch were removed. Reduction of sharp bony edges was done by 3-4 mm (Fig. 9-12).

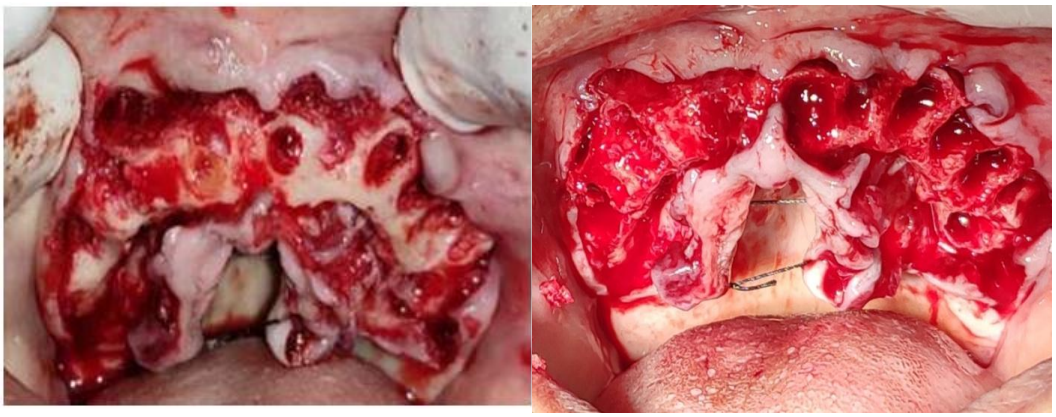

Figure 9-12: Crestal incision, atraumatic extraction and bone reduction.

The implant angulation guide was placed and osteotomy was done. Then the implants were placed over the preselected regions (12, 21, 14 and 25) (Fig. 13-16). The multiunit abutment was placed over the implants with the angle of 30^0 and imprints of multiunit abutments were made on the temporary prosthesis. Interrupted suturing was done and temporary cylinders were placed over the abutments (Fig. 17-20). Postoperative OPG was taken, relining of temporary prosthesis was done and it was placed over the abutments (Fig. 21-24). The patient was advised with post-operative instructions and followed up for 3 months.

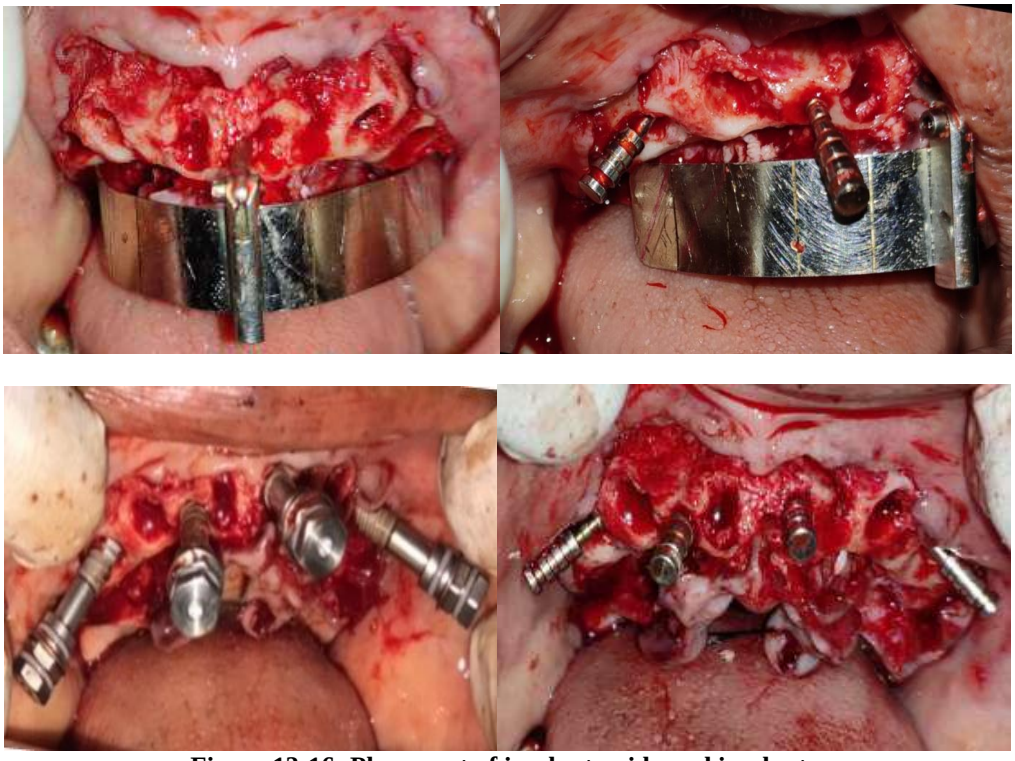

Figure 13-16: Placement of implant guide and implants.

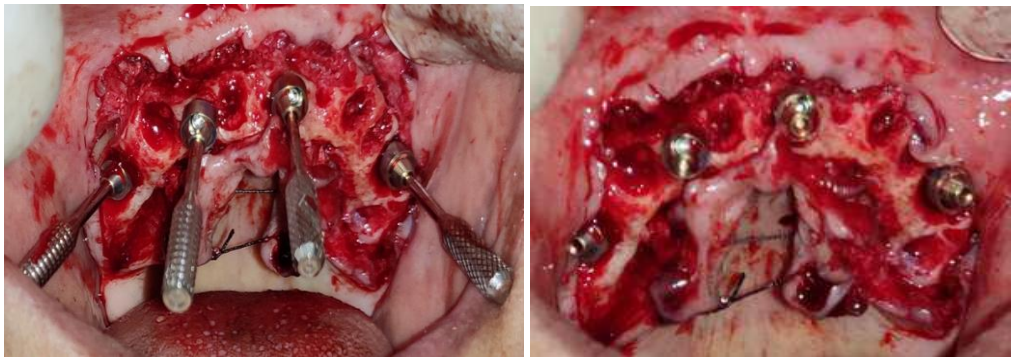

Figure 17-20: Placement and imprint of multiunit abutments.

Figure 21-24: Postoperative OPG, relining of temporary prosthesis and its placement over the abutments.

Figure 25-28: Placement of gingival cups, custom tray and impression posts.

The restorative treatment was planned after 3 months when the maxilla showed complete healing. Gingival cups were placed over the multiunit abutments and an irreversible hydrocolloid impression was made for the purpose of making a cast for the jaw relation. Impression posts were placed over the multiunit abutments for the purpose of taking implant level impression. Custom tray was prepared for an open tray impression (Fig. 25-28).

Stabilizing the impression posts was done with ligature wire. The position was secured with pattern resin and the jig trial was done. The open tray impression was made (Fig. 29-32). The jaw relation was established. Metal bar framework was tried with a single screw test. Bite registration was done and the final prosthesis was placed (Fig. 33-37).

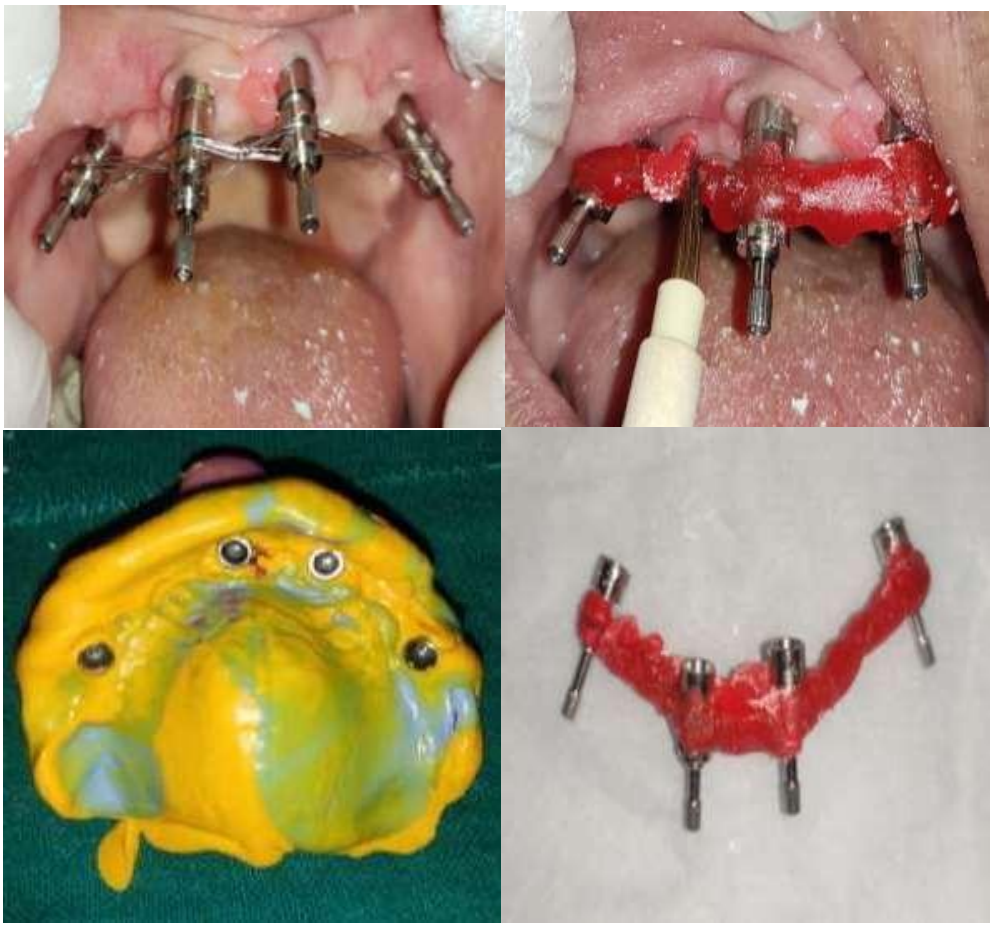

Figure 29-32: Stabilizing and positioning of the posts and jig trial, open tray impression.

Figure 33-37: Jaw relation, metal bar framework, bite registration, final prosthesis and post- operative photograph.

DISCUSSION

The 'All-on-4' treatment proved to be an excellent option, with its use of straight and angled multiunit abutments, which was developed to provide edentulous patients with an immediately loaded full arch restoration on only four implants. Malo and colleagues reported 97.6% 1-year survival rate with the 128 branemark implants in 32 patients. Additionally, Malo and colleagues reported 97.2% 1-year survival rate for mandible and 100% 1-year survival rate for maxilla with 92 Nobel Speedy implants in 23 patients. After 9 years of follow-up, Malo and colleaguesreported 96.2% survival rate, and after up to 5 years follow-up for maxilla 97.7% survival rateachieved.[13] The cumulative success rate of implants placed for the complete rehabilitation of the maxilla ranged between 93%, 4% and 100% for early loading with a follow-up between1 and 5 years[14-17], and between 91% and 100% for immediate function with a follow-up between 1 and 5 years.[18-21] The present treatment concept uses the load- bearing capacity of the maxillary bone in a favourable manner. Owing to the freedom of tilting, the implants can be anchored in dense bone structures (anterior bone with higher density) and well-spread anteriorly-posteriorly, giving an effective prosthetic base. By reducing the number of implants to four, each implant can be placed without interference with adjacent implants. This treatment approach, using tilting and few implants rather than inserting several implants competing for space, has demonstrated good results in a previous study with delayed loading, and in immediate function.[22]

In this case, we stabilized the implants by fixing them with pattern resin. To provide immediate functioning, all-acrylic prosthesis were placed a immediately after the surgery.

The main advantages of 'All-on-4' technique, when compared to bone graft or zygomatic implant techniques are lesser surgical morbidity as well as optimal use of the residual alveolar ridge. Furthermore, there are no significant differences between axial and tilted implants in terms of success rates and marginal bone loss. Implant angulations has many advantages, including increased implant length, apical cortical fixation, and secondary stabilization from the sides of the implants and, most importantly, increased anteroposterior spread and decreasedlength of cantilevers. Cantilevers should not be present in the provisional prosthesis but can be approximately 10 mm in a bar-supported definitive prosthesis. This in turn can significantly decrease the vertical forces on the implants as well as the interfacial stresses and strains.[23-25]

CONCLUSON

The "All on 4" concept is based on the placement of four implants (two axial and two tilted implants) in the anterior part of fully edentulous jaws to support a provisional, fixed, and immediately loaded full-arch prosthesis. Combining tilted and straight implants for supporting fixed prostheses can be considered a viable treatment modality resulting in a simpler and less time consuming procedure, with significantly less morbidity,

in decreased financial costs and a more comfortable postsurgical period for the patients.

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